Case Study
Chemical Warfare Materiel (CWM) Removal Action
Mongmong, Guam

Background

In mid-July 1999, a resident of Mongmong exposed PIGS containing Chemical Agent Identification Sets (CAIS) while excavating in his backyard to install a waterline. The Environmental Protection Agency (EPA) initiated an emergency response action on 16 July and identified a 300-foot radius from the initial recovery area as the site. During this response the United States Army Technical Escort Unit (TEU) recovered 16 exposed pigs from the open pit, and packaged and transported them to Anderson AFB for subsequent shipment to Johnston Island for disposal. All pigs were found in one pit and all were intact. This operation was completed near the end of July and EPA turned the lead over to U.S. Army Corps of Engineers to perform additional characterization and removal if necessary. The objective was to characterize the 600 foot diameter site and remove any remaining hazards.

Organization

The Corps of Engineers Honolulu District (CEPOH) was assigned as the overall project manager for this action. They were responsible for obtaining funding, rights of entry, public affairs, providing logistical support, brush and debris clearance, and HTW characterization and disposal.

The Corps of Engineers Engineering and Support Center, Huntsville (CEHNC) was responsible for coordinating the CWM aspects of the project, forming the CWM project team, providing the necessary technical expertise, and ensuring the safety of the team and the public.

Product Manager for Non-Stockpile Chemical Materiel (PMNSCM) had the responsibility of locating an Interim Holding Facility, arranging for transport to a disposal site, and final disposal of the CWM.

Technical Escort Unit was responsible for excavating, identifying, recovery, containment, transport to the IHF, assessment of CWM, and transport to the disposal site.

Edgewood Chemical and Biological Command was responsible for air monitoring for CWM during

excavations, analyzing soils for CWM and associated breakdown products, and constructing the engineering control structure and providing the air filters.

Parsons Engineering Science, Inc. (Parsons ES) was hired by CEHNC to develop the Site Safety Submission, provide geophysical mapping and other site support, coordinate analytical samples, coordinate subcontractors, and document site activities.

Human Factors Applications, Inc. (HFA) was a subcontractor to Parsons ES, responsible for assisting TEU with all aspects of the excavation tasks.

Starting Assumptions

Early cost estimates by CEHNC showed costs of nearly $5 million for characterizing and clearing the 300-foot radius. This was based on the initial assumptions that all anomalies must be investigated as potential CWM and that conventional ordnance and explosives may be encountered. The Honolulu District Commander, based on his visual reconnaissance and on the history of site use, prepared a risk assessment declaring that only CAIS pigs would be encountered, and that they would not occur as single anomalies but would be found in large pits. He also determined that we would probably not encounter UXO during our excavations. This decision allowed us to work under much less stringent conditions and approach much of the work as non-CWM, and eventually saved over $2 million off the original estimate.

CWM anomalies were defined as having geophysical signatures equal to or greater than three pigs. These anomalies could only be excavated after a CWM Safety Submission was prepared which ensured that the workers and public would be protected from an accidental release of CWM. The Safety Submission would have to be approved by DDESB. The team would have to undergo normal CWM procedures to include tabletop and pre-operational exercises to prove they understood the work procedures before work could start.

Non-CWM (or non-pit) anomalies were defined as anomalies with signatures equal to or greater than one pig and less than three pigs. Anomalies with signatures less than one pig would not be investigated. This criterion required that a Work and Safety Plan be prepared and approved by Huntsville. This work plan would be in place several weeks before the Safety Submission, and therefore geophysical mapping and

excavation of non-pit anomalies could occur while waiting for approval of the longer-lead Safety Submission.

Another difficult issue was deciding on a Maximum Credible Event (MCE). The team had a lot of confidence that all CAIS kits would be contained in the pig, and that there would be no release of agent. However, in accordance with standard CWM procedures, the MCE was established as the evaporative release of a 40 milliliter vial of phosgene agent. This MCE drove the establishment of a 132-meter NOSE distance, which was the distance beyond which the public would experience NO SIGNIFICANT EFFECTS if the MCE was to occur.

Schedule was all-important for this project. Not only was the Government of Guam pushing for immediate action, but the project team had a limited window of opportunity. The personnel committed to Guam must be free by June 2000 to begin fieldwork on other projects. In October of 1999 the team committed to completing beginning fieldwork in February 2000 and completing it by June 2000. By mid-February the work plan for the geophysical mapping and non-CWM portions of the work had been completed and approved, and on 17 February the team began mobilization to the site.

Safety Submission

Concurrently with the work plan development, the Safety Submission was developed under extreme timelines. HQUSACE Safety Office, DA Safety, USATCES, and DDESB all expedited their reviews of the submission. The draft submission was written in about a month’s time and reviewed by the Government just before Christmas. Much time was saved by a January on-board review that was attended by all team members and by USATCES, which was responsible for the ultimate recommendation to DDESB for approval of the submission. The reviewing agencies also cooperated by making themselves available on the needed dates for the dry run exercises that took place a week before start of excavation.

Geophysics Investigation

Between February 28 and March 8, the geophysical investigation was executed. A test plot was established near the project site. Pig simulants were buried at various depths and configurations to establish detection limits of the geophysical instruments. Detection limits and depth restrictions based on the test plot data were

then used to distinguish between likely CWM pit anomalies and non-pit anomalies. Then the entire site was digitally mapped, and dig sheets were prepared identifying all CWM and non-pit anomalies.

Non-Pit Excavations

Starting on March 1, as dig sheets were made available, the non-pit excavations began. After 489 items had been dug without any trace of CWM items, a live 5-inch projectile was discovered on March 13. The local U.S. Navy EOD Unit responded quickly to remove the item, but the project team now had to step back and review whether to continue to approach this as a non-UXO site. The Huntsville Safety Office determined that excavations could continue, but a Minimum Separation Distance (MSD) of 300 feet was now established for all non-pit excavations. The public would have to be evacuated for all future excavations. The operation was suspended so that lodging arrangements could be made for the residents who would have to be displaced. At this point it was also necessary that the project team receive their scheduled CWM safety training and prepare for the table-top exercise and the pre-operation survey (or dry run). These activities required nearly two work weeks.

CWM Excavation

The pre-op survey was the last step in receiving the highest level of approval to start the actual CWM excavation. During the pre-op, discrepancies were identified and corrected on site, including changes to the Safety Submission. On March 28 excavation began over the area where the CAIS pigs had originally been discovered, and which geophysical data also indicated the highest potential for concentration of metals. Workers immediately uncovered more CAIS pigs and began packaging them for transport to a secure location on Anderson AFB. A total of 19 pigs were recovered from this pit, requiring four moves of the ECS. The ECS was set up over two more potential pits, but no more CWM was discovered.

Work was conducted inside an Engineering Control Structure (ECS) which consisted of a commercial tent modified to accept special filters to intercept contaminated air before it could escape the ECS. The ECS was also air conditioned to minimize the potential for heat related illnesses, especially when work was performed in Level C and Level B personnel protective

clothing (Tyvek F suits). Even with the air conditioning, the PPE levels and published heat stress guidance dictated very short work periods. With the concurrence of the Occupational Physician, a procedure of medical monitoring was established to monitor worker body temperature immediately upon exiting the decontamination station. If all members of the team tolerated the heat and work period as evidenced by no increased body temperature, their work period was extended on the next cycle. In this manner we were able to extend the work periods without any heat illnesses.

Excavations ended on 17 April and the team shifted their operation to Anderson AFB to assess the pigs for shipment. The assessment was completed by May 4 and the project team closed down the project site until negotiations with the residents around the site could be completed.

Public Participation

Honolulu District took the lead on keeping the public informed on the actual hazards of the CAIS sets, details of the planned removals, and the need for public cooperation in making the project a success. Several public meetings were held in the months preceding the sitework, and the public proved to be very cooperative when it was learned that evacuations could not be avoided once the CWM pit excavations began. Once the 5-inch round was discovered and it was determined that evacuations were needed in order to complete the non-pit excavations, Honolulu District found it necessary to move to night operations. Otherwise they would be faced with costly interruption of several businesses in the area.

Completion of Non-Pit Excavations

On May 22, the project team re-mobilized to the site to begin night operations. During the CWM excavations it had been found that actual pig signatures were about 6 times greater than the simulant signatures. The dig thresholds for non-pit excavations were therefore raised accordingly, and most of the former CWM anomalies now fell under non-pit thresholds. Between May 24 and June 2 the team excavated another 617 anomalies, using portable light carts for illumination. No further indications of CWM were found, but on the last day another 5-inch projectile was discovered. It was again removed by U.S. Navy EOD.

Follow-Up Actions

On 7 October, all 35 CAIS pigs were transported by air to Johnston Island for disposal at the Chemical Agent Disposal facility. Archives searches are being planned for all formerly used defense site on Guam. An Engineering Evaluation/Cost Analysis is programmed for the former 5th Field Marine Supply Depot where the CAIS pigs were found.

Conclusion

This project can be considered a great success by both government and public standards. Innovative strategies led to cost savings that greatly benefited the taxpayer. Valuable lessons were learned which will benefit future projects. Teamwork and close coordination among the many federal and local agencies and contractors contributed to efficiency and to public acceptance of the action.